EV8847-D-00A

6A High Efficient Synchronous Step-Down Switcher with I²C Interface

The Future of Analog IC Technology

DESCRIPTION

The MP8847 is a highly integrated and high frequency synchronous step-down switcher with I^2C control interface. It is optimized to support up to 6A load current over an input supply range from 2.7V to 6V with excellent load and line regulation.

Constant frequency hysteretic mode provides extremely fast transient response without loop compensation and easily achieves high efficiency under light load condition.

The output voltage level can be controlled, on-the fly through a 3.4Mbps I^2C serial interface. Voltage range can be adjusted from 0.6V to 1.235V in 5mV steps.

Voltage slew rate, switching frequency and power savings mode are also selectable through the I^2C interface.

The MP8847 requires a minimum number of readily available standard external components and is available in the compact QFN 2mmx3mm package.

FEATURES

- 2.7V to 6V Input Voltage Range
- Up to 6A Load Current
- Internal 35mΩ High-Side, 15mΩ Low-Side Power MOSFETs
- I^2C Compatible Interface up to 3.4Mbps
- I^2C Programmable Output Range from 0.6V to 1.235V in 5mV Steps
- Factory Adjustable Switching Frequency from 0.85MHz to 2.2MHz
- Power Saving Mode Selectable via I2C
- Internal 1ms Soft-Start
- Power Good Indicator
- Current Overload and Thermal Shutdown Protection
- Available in QFN 2mmx3mm package

APPLICATIONS

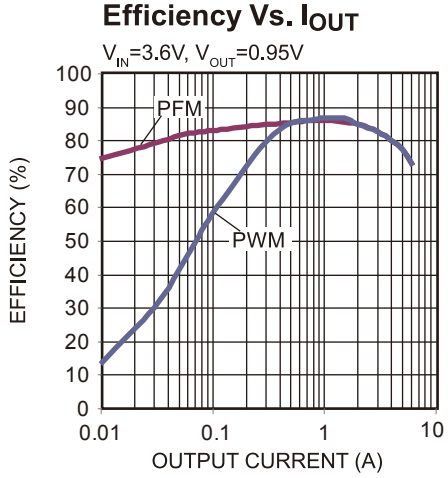
- Processor Core Supply
- Micro Converter

ELECTRICAL SPECIFICATION

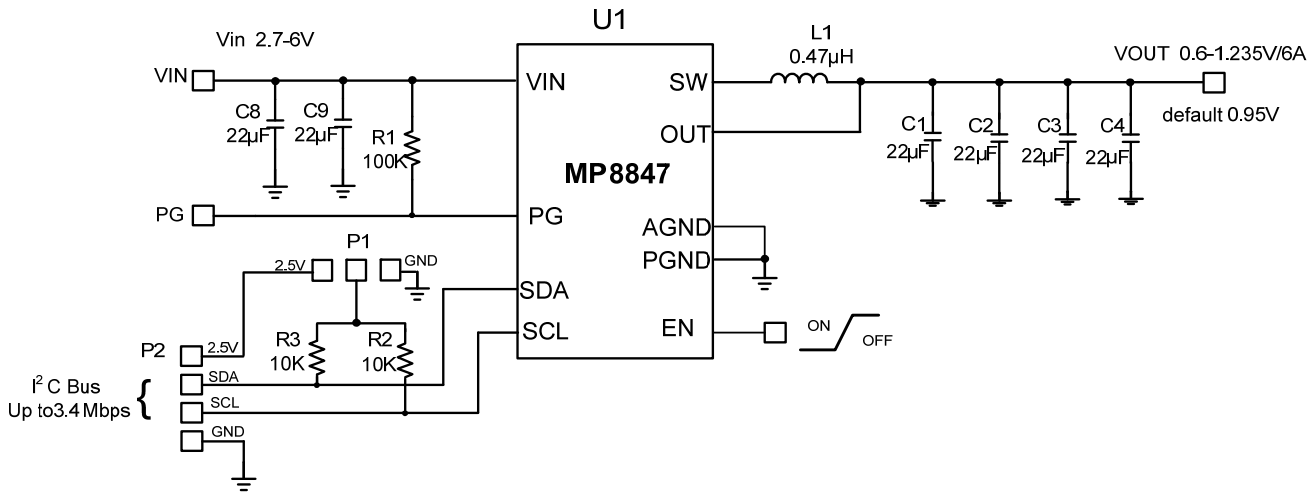
Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	2.7– 6	V
Output Voltage	V_{OUT}	0.95	V
Output Current	I_{OUT}	6	A

EV8847-D-00A EVALUATION BOARD

Board Number	MPS IC Number
EV8847-D-00A	MP8847GD



EVALUATION BOARD SCHEMATIC



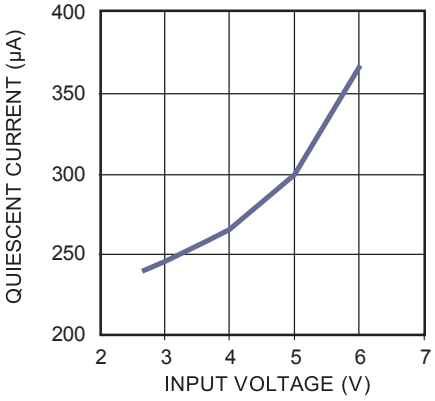
EV8847-D-00A BILL OF MATERIALS

Qty	RefDes	Value	Description	Package	Manufacturer	Manufacturer P/N
4	C1, C2, C3, C4	22µF	Ceramic Cap, 6.3V, X5R	SM0805	muRata	GRM21BR60J226ME39L
2	C8,C9	22µF	Ceramic Cap,10V, X5R	SM0603	muRata	GRM21BD71A226ME44L
3	C5, C6, C7	NS				
1	R1	100k	Film Res.,5%	SM0603	Any	
2	R2, R3	10k	Film Res.,5%	SM0603	Any	
1	L1	0.47µH	Inductor IR=6.8A,Isat=14.5A	SM 4.0X4.0mm	Wurth	744 373 240 047
1	U1	MP8847	Step Down Switcher With I2C	QFN-2mmx3mm	MPS	MP8847DG

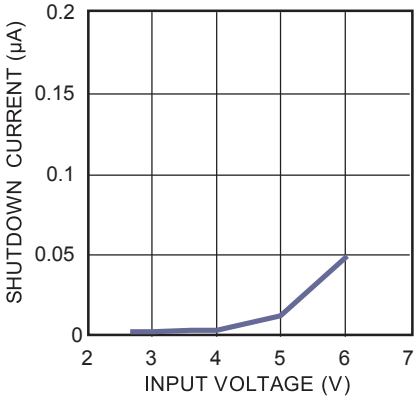
EVB TEST RESULTS

Performance waveforms are tested on the evaluation board.
V_{IN} = 5V, V_{OUT} = 0.95V, L = 0.47µH, T_A = 25°C, unless otherwise noted.

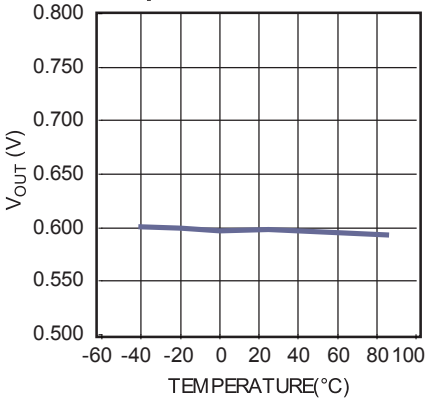
Quiescent Current vs. Input Voltage



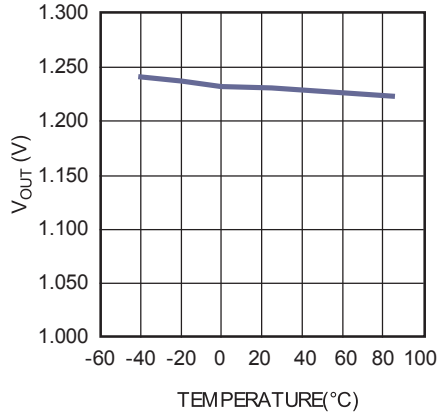
Shutdown Current vs. Input voltage



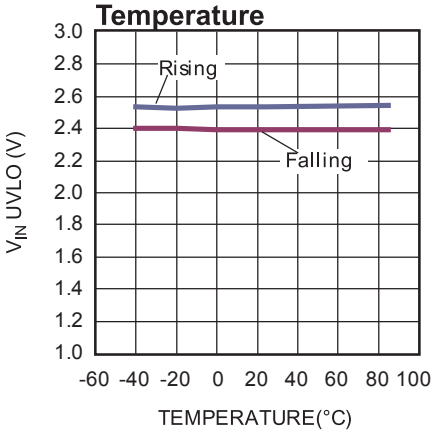
Lowest Vout vs. Temperature



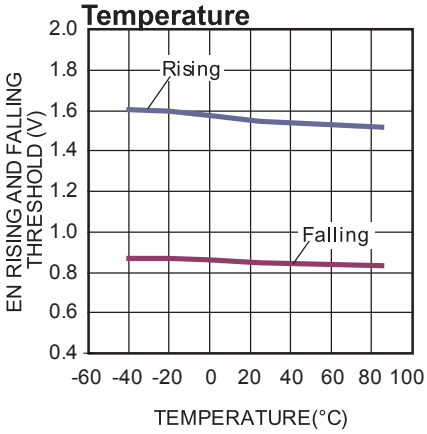
Highest V_{OUT} vs. Temperature



V_{IN} UVLO Rising and Falling Threshold vs. Temperature

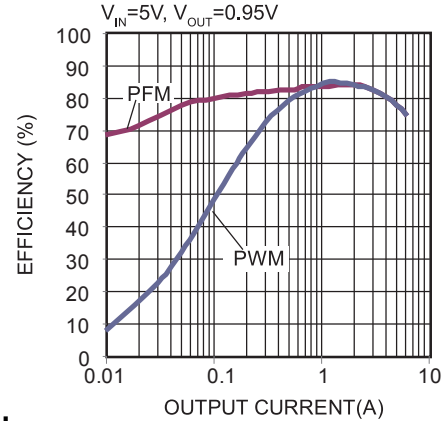


EN Rising and Falling Threshold vs. Temperature



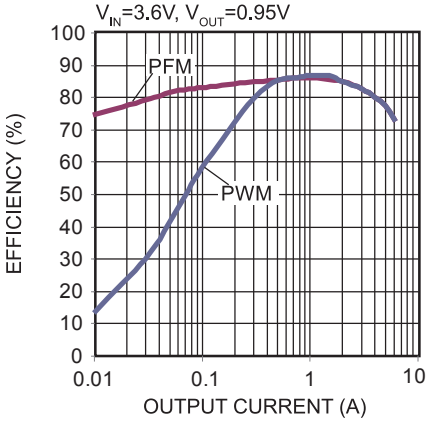
Efficiency Vs. I_{OUT}

V_{IN}=5V, V_{OUT}=0.95V

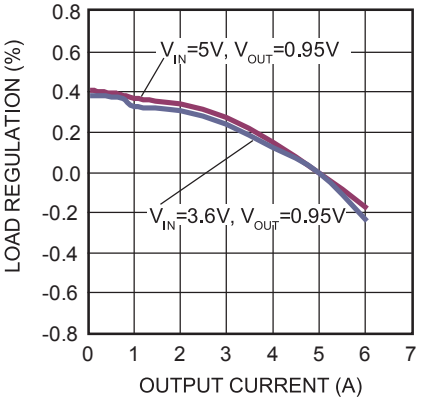


Efficiency Vs. I_{OUT}

V_{IN}=3.6V, V_{OUT}=0.95V



Load Regulation Vs. I_{OUT}



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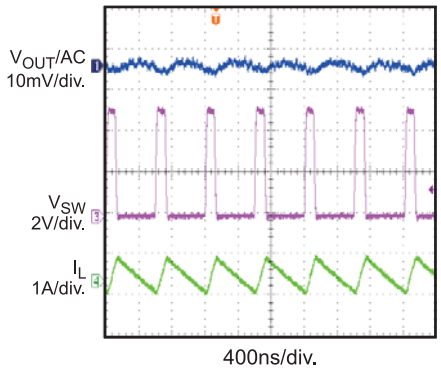
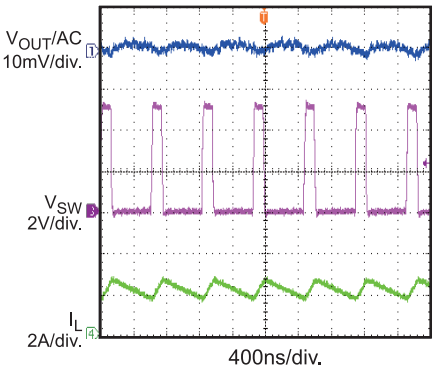
EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.
V_{IN} = 5V, V_{OUT} = 0.95V, L = 0.47µH, T_A = 25°C, unless otherwise noted.

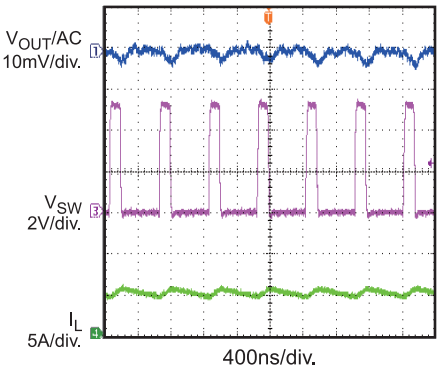
Output Ripple
I_{OUT} = 0A



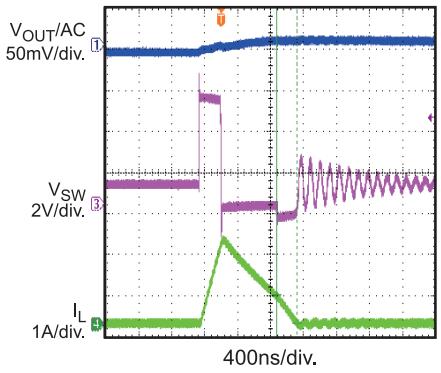
Output Ripple
I_{OUT} = 2A



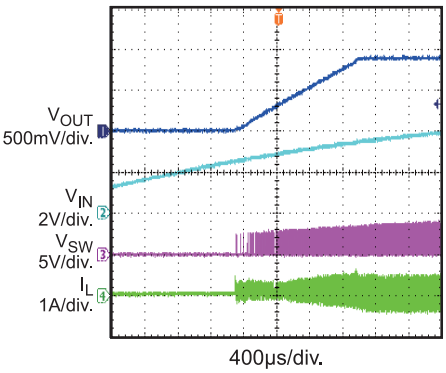
Output Ripple
I_{OUT} = 5A



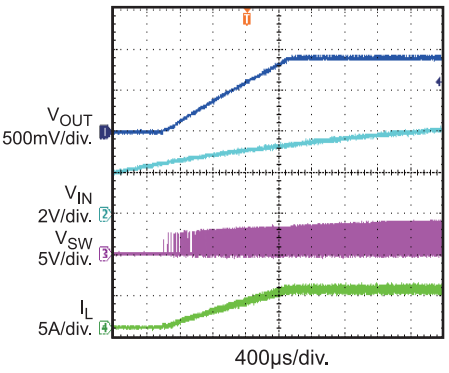
Output Ripple
PFM Mode



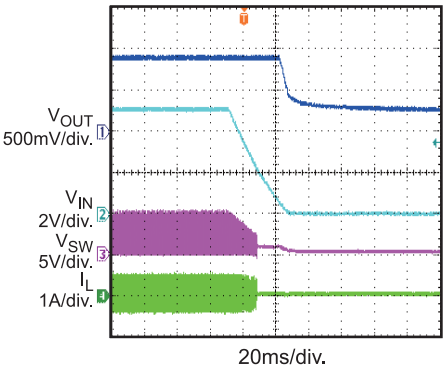
V_{IN} Power Up
I_{OUT} = 0A



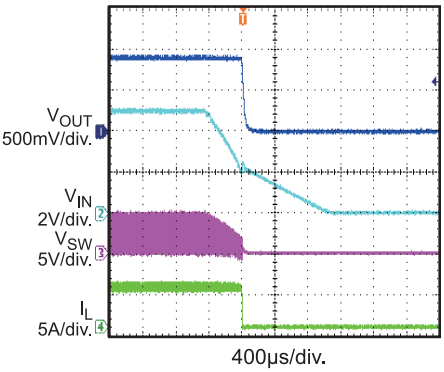
V_{IN} Power Up
I_{OUT} = 5A



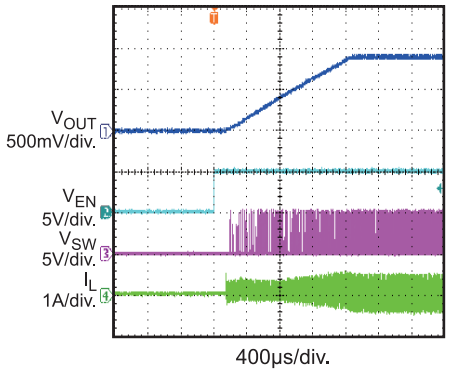
V_{IN} Power Down
I_{OUT} = 0A



V_{IN} Power Down
I_{OUT} = 5A



EN On
I_{OUT} = 0A



EVB TEST RESULTS *(continued)*

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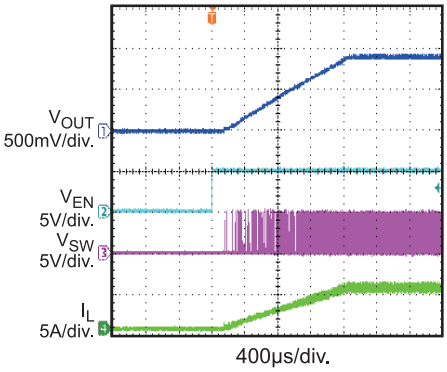
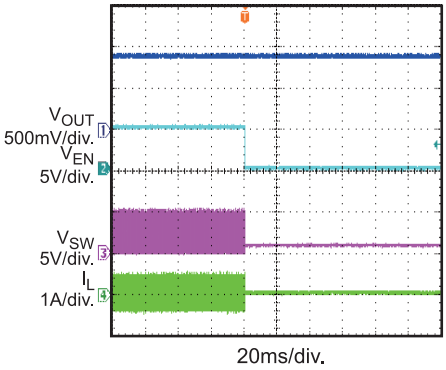
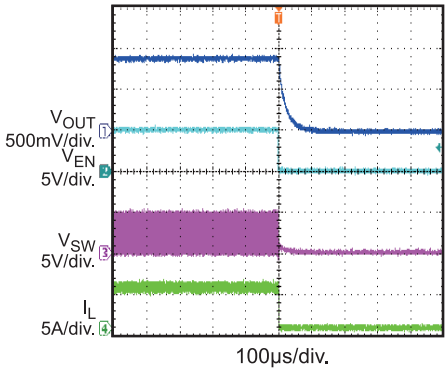
EN On
I_{OUT} = 5A



EN Down
I_{OUT} = 0A



EN Down
I_{OUT} = 5A



PRINTED CIRCUIT BOARD LAYER

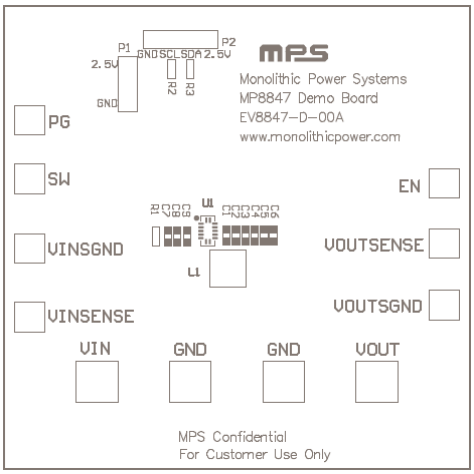


Figure 1: Top Silk Layer

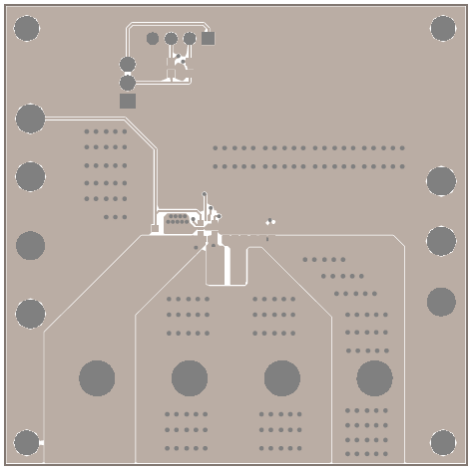


Figure 2: Top Layer

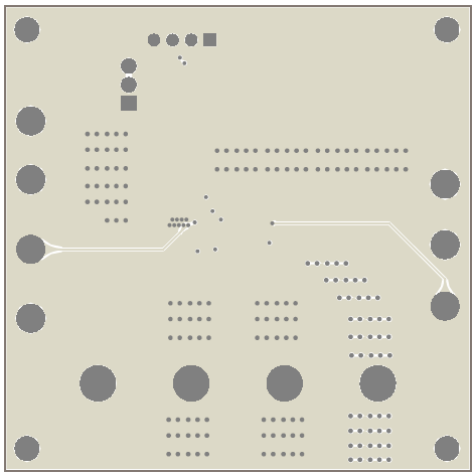


Figure 3: Internal Layer1

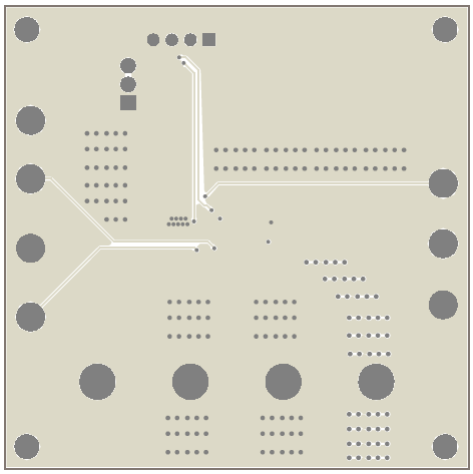


Figure 4: Internal Layer2

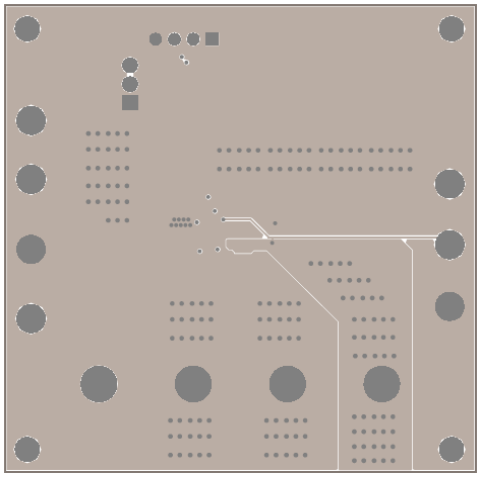


Figure 5: Bottom Layer

QUICK START GUIDE

1. Connect the positive and negative terminals of the load to the VOUT and GND pins, respectively.
2. Preset the power supply output between 2.7V and 6V, and then turn off the power supply.
3. Connect the positive and negative terminals of the power supply output to the VIN and GND pins, respectively.
4. Turn the power supply on and make EN voltage more than threshold. The board will automatically start up.
5. Refer to MPS IIC Interface System user manual for I^2C application.

LAYOUT RECOMMENDATION OF MP8847

Proper layout of the switching power supplies is very important, and sometimes critical to make it work properly. Especially, for the high switching frequency converter, if the layout is not carefully done, the regulator could show poor line or load regulation, stability issues.